Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Specific heat of a one-dimensional interacting Fermi system ANDREY CHUBUKOV, University of Wisconsin, DMITRR MASLOV, University of Florida, RONOJOY SAHA, University of Oregon — We re-visit the issue of the temperature dependence of the specific heat $C(T)$ for interacting fermions in 1D. The charge component $C_c(T)$ scales linearly with T, but the spin component $C_s(T)$ displays a more complex behavior with T as it depends on the backscattering amplitude, g_1, which scales down under RG transformation and eventually behaves as $g_1(T) \sim 1/\log T$. We show, however, by direct perturbative calculations that $C_s(T)$ is strictly linear in T to order g_1^2 as it contains the renormalized backscattering amplitude not on the scale of T, but at the cutoff scale set by the momentum dependence of the interaction around $2k_F$. The running amplitude $g_1(T)$ appears only at third order and gives rise to an extra $T/\log^3 T$ term in $C_s(T)$. This agrees with the results obtained by a variety of bosonization techniques. We also show how to obtain the same expansion in g_1 within the sine-Gordon model.

Andrey Chubukov
University of Wisconsin

Date submitted: 27 Nov 2007 Electronic form version 1.4